

CLAIMS

1. A method of determining a distance between a transmitting station and a receiving station comprising the steps of:

5 determining a characteristic parameter describing the line-of-sight conditions of the radio propagation environment of the receiving station;

measuring at least one feature of a signal received from the transmitting station at the receiving station, said feature
10 being such that it can be used for determination of the distance between the transmitting station and the receiving station; and

computing the distance between the transmitting station and the receiving station using said measured signal feature
15 and the characteristic parameter describing the line-of-sight conditions of the receiving station.

2. A method according to claim 1, further comprising a step
20 of determining the current geographical location of the transmitting station.

3. A method according to claim 1 or 2, further comprising:
determining at least one further distance between the
transmitting station and at least one further receiving station
25 having a characteristic parameter describing the line-of-sight conditions of the radio propagation environment of the at least one further receiving station; and

determining the current geographical location of the
transmitting station based on the determined distances between
30 the transmitting station and said at least two receiving stations.

4. A method according to claim 1, further comprising:

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determining at least one further distance between the receiving station and at least one further transmitting station having a characteristic parameter describing the line-of-sight conditions of the radio propagation environment of the at least one further transmitting station; and

determining the current geographical location of the receiving station based on the determined distances between the receiving station and said at least two transmitting stations.

5 10 5. A method according to any of the preceding claims, wherein said feature to be measured comprises travel time of the signal between the transmitting and receiving stations.

15 6. A method according to any of the preceding claims, wherein said feature to be measured comprises signal travel time differences between the transmitting and receiving stations.

20 7. A method according to any of the preceding claims, wherein said feature to be measured comprises the strength of the received signal.

25 8. A method according to any of the preceding claims, wherein said feature to be measured comprises the quality of the received signal.

30 9. A method according to any of the preceding claims, comprising use of a weighted least square method for the determination of distances between the receiving and transmitting stations, wherein the used weighting matrix is the inverse of an error covariance matrix.

10. A method according to any of the preceding claims, comprising steps of:

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defining the radio propagation environments for several stations; and

classifying the stations in different radio propagation environment classes;

5 wherein the characteristic parameter is based on the class of the station.

10 11. A method according to any of the preceding claims, wherein the data for the characteristic parameter is stored and processed in a location service node implemented in a telecommunications system.

15 12. A method according to any of the preceding claims, wherein the stations are connected to a mobile telecommunications system, the transmitting station being a mobile station and the receiving station being a base station of the mobile telecommunications system or vice versa.

20 13. A method according to any of the preceding claims, wherein the determination of the characteristic parameter comprises steps of:

determining the current geographical location of at least one of the stations by means which are external to the telecommunications system; and

25 inputting the results of the determination to the telecommunications system.

30 14. A method according to claim 13, comprising use of a satellite based positioning system for the determination of the current geographical location of at least one of the stations.

15. An arrangement for determining a distance between a transmitting station and a receiving station, comprising:

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storage means for storing a characteristic parameter describing the line-of-sight conditions of the radio propagation environment of the receiving station;

measurement means for measuring a feature of a signal transmitted from the transmitting station to the receiving station for determination of the distance between the transmitting station and the receiving station;

a controller for receiving the outcome of said measurement and for defining the distance between the transmitting station and the receiving station on the basis of the outcome of the measurement and said characteristic parameter.

16. An arrangement according to claim 15, wherein the controller comprises means for determining a current geographical location of one of the stations.

17. An arrangement according to claim 16, comprising:

at least one further receiving station having a substantially fixed location and provided with a characteristic parameter describing the line-of-sight conditions of the radio propagation environment of said at least one further receiving station;

means for measuring a feature of a signal transmitted from the transmitting station to the at least one further receiving station for determination of the distance between the transmitting station and the at least one further receiving station;

wherein the arrangement is such that the outcome of the measurement of the feature of the signal transmitted to the at least one further receiving station is also used when determining the location of the transmitting station.

18. An arrangement according to claim 16, comprising:

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at least one further transmitting station having a substantially fixed location and provided with a characteristic parameter describing the line-of-sight conditions of the radio propagation environment of said at least one further

5 transmitting station;

means for measuring a feature of a signal transmitted from the at least one further transmitting station to the receiving station for determination of the distance between the receiving station and the at least one further transmitting station;

wherein the arrangement is such that the outcome of the measurement of the feature of the signal transmitted from the at least one further transmitting station is also used when determining the location of the receiving station.

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19. An arrangement according to any of claims 15 to 18, wherein different radio propagation environments of different stations are classified in different radio propagation environment classes and the characteristic parameter is based on the class of the station.

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20. An arrangement according to any of claims 15 to 19, wherein the feature of the signal is based on one or several of the following: travel time of the signal between the transmitting and receiving stations, signal travel time difference between the transmitting and receiving stations, the strength of the received signal, the quality of the received signal.

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30 21. An arrangement according to any of claims 15 to 20, comprising a mobile telecommunications system, wherein the transmitting station is a mobile station and the receiving

station is a base station of the mobile telecommunications system or vice versa.

22. An arrangement according to claim 21, wherein the receiving station comprises a sector antenna.

23. A location server for use in a telecommunications system for provision of location data of a mobile station having a radio connection with at least one base station of the telecommunications system, comprising:

means for receiving measurement data from the telecommunications system concerning a feature of the connection between the mobile station and the base station for determination of the distance between the mobile station and the base station;

storage means for storing a characteristic parameter describing the line-of-sight conditions of the radio propagation environment of the base station;

control means for defining the distance between the mobile station and the base station on the basis of the received measurement data and said characteristic parameter.

24. An arrangement in a telecommunications system for creating and/or updating data concerning the radio propagation environment of a station of the telecommunications system, comprising:

a first station;

a second station for communicating by radio with the first station;

means for defining the current geographical location of the first station by means of a source of location information that is external to the telecommunications system;

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determining means for determining a feature of a radio signal received by one of the stations from the other of the stations; and

5 calculating means for calculating a parameter describing the line-of-sight conditions of the radio propagation environment by means of the determined current geographical location of the first station and the said determined feature.

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10 25. An arrangement according to claim 24, comprising means for receiving signals from a satellite based positioning system.

15 26. An arrangement according to claim 24 or 25, comprising means for determining if an update of the data concerning the radio propagation environment is required.

20 27. An arrangement according to any of claims 24 to 26, wherein the first station comprises a portable device comprising the determining means for determining the feature of the radio signal.

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